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AND

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What are the uses of bright colors in Hymenoptera?

BY T. D. A. COCKERELL.

Following somewhat on the lines indicated in my letter published in the February number, p. 27, with the editor's permission, I will put the above question to your readers. Hereafter, I may have something to say on the uses of color among insects in general, but the present question seems so suitable for general investigation that I will briefly give some of the *pros* and *cons* and leave your readers to work the matter out themselves if they will. In that admirable work, "Darwinism," Dr. A. R. Wallace lays considerable stress on "Warning coloration," and shows that many animals are conspicuously colored as a sign that they are dangerous or inedible. With insects this is said to be specially noticeable, and thus insectivorous birds and other enemies of the insect tribes get to know and avoid those they cannot eat, to the great advantage of such.

On p. 233 of "Darwinism" is a reference to the Aculeate Hymenoptera in this connection, as follows: "We all know how well marked and conspicuous are the colors and forms of the stinging wasps and bees, no one of which in any part of the world

is known to be protectively colored like the majority of defenceless insects." Reading this I at once called to mind the numerous dull-colored species of *Andrena*, *Halictus*, etc., and the brilliantly-colored, non-aculeate Chrysididæ and Chalcididæ, so that it seemed to me that in this case, at any rate, "warning coloration" was not self-evident, so I submitted the point to Dr. Wallace, himself, who replied:

"Though the Andrenidæ are not usually gayly colored, yet they are not *inconspicuous*. The Chrysididæ are, I should think, colored so brilliantly partly, perhaps, to simulate stinging species, and partly to prevent their being taken for fruits or seeds when rolled up. They are *very* hard, and like many hard beetles are colored as a *warning of inedibility*." (A. R. Wallace *in litt.* Feb. 10, 1890)

Here it would be interesting to learn whether the Chrysididæ* are eaten by insectivorous birds. A spider, *Xysticus cristatus*, has been recorded as preying on *Chrysis ignita* in Lincolnshire, England, by Mr. H. W. Kew.

But to return to the *aculeata*, are they notable for warning coloration? To ascertain the exact state of the case from one who has paid much attention to the subject. I applied to Mr. Ashmead and here is his reply:

"The family Chalcididæ is without doubt the most extensive in the order, and taken as a whole the most brilliantly colored; no other family, not even excepting the Chrysididæ, can compare with it in the metallic brilliancy of its members. "In my opinion, when the species are thoroughly worked up, in this single family alone, their members will more than double the species in *all* the families of the *Aculeata* taken together, so numerous are they.

"It is really only among the parasitic bees that we find much brilliant metallic coloring, a few genera in Apidæ and Andrenidæ.

"In Andrenidæ only two genera, *Angochlora* and *Agapostemon* are very brilliant, although some *Halicti* show some.

* Although the Chrysididæ are classed with the bees, etc., they are not *aculeata*. Mr. Ashmead has kindly stated their systematic position to me as follows: "Although they are certainly *Hymenoptera monotrocha* and belong to the section with the bees, strictly speaking they can hardly be called true *Aculeata*, being, as Latreille observes, 'sur les confins des deux sections,' and were formerly classed with the *Terebrantia*. I agree with Westwood in considering them more closely allied to certain Proctotrupids, i.e., the Dryninæ ane Bethylinæ, than to the bees. If I had the time I could point out some very remarkable structural similarities." (*in litt.* Feb. 5, 1890)

"I am of course speaking of the insects found in N. America, as I am not very familiar with exotic or oriental forms.

"In family Vespidæ there are none; in Eumenidæ none; in Masaridæ none; in Crabronidæ only a few species in the genera *Trypoxylon* and *Oxybelus* show any and then usually confined to the pubescence; in Pemphredonidæ all are black or ornate with white and yellow; in Mellinidæ and Mimesidæ the same, although sometimes the pubescence is silvery or golden; in the Philanthidæ they are highly colored, but are not metallic, or but seldom show any metallic splendor; in Nyssonidæ and Bembicidæ the same; in the Larridæ some of the forms do, but strictly speaking they are not brilliant, and the metallic coloring is usually confined to the vestiture; the family Ampulicidæ has but one species in America, and that is dark colored. In the family Sphecidæ a large percentage show metallic colors, but only a few are very brilliant; in Pompilidæ only a few; the Sapygidæ are highly colored, but not metallic; in the Scoliidæ only a few forms, while in the Mutillidæ and Formicidæ none that I know of.

"So now you have the showing, the North American *Aculeata* make, in a nutshell (W. H. Ashmead *in litt.* Feb. 5, 1890)."

From which summary it becomes evident that, as a whole, the *aculeata* do not compare in brilliancy with very many of the non-stinging kinds. Nor is it clear that the stings altogether protect the bees and wasps from birds, or render them inedible. Dr. Wallace remarks (Darwinism, p. 239): "We see that even the powerful stings of bees and wasps only protect them against some enemies, since a tribe of birds, the bee-eaters, have been developed to feed upon them, and some frogs and lizards do so occasionally."

Dr. Riley records that sparrows (*Passer domesticus*) feed on *Halictus*, *Tiphia*, *Myzine* and ants. In no less than *thirty* cases was *Myzine sexcincta* found in the sparrow's stomachs, and this is a brightly marked (though not metallic) species, which, perhaps, theoretically should not have been eaten. I have found ants in the stomach of *Sialia arctica*, shot in Custer County, Col. The stomach of a woodpecker, shot by Rev. A. Wright in the same locality, contained a great number of ants; the majority apparently *Formica fusca*, with a few *F. integra*. In England the tom-tit (*Parus*) is known to wage constant war against *Bombus*.

So clearly, the *Aculeata* do not always escape! *Myzine sexcincta* is marked pretty much as most of the species of *Vespa*, *Odynerus* and *Crabro*, and yet is not protected. So here is the great class of yellow markings on black, apparently useless for warning purposes. The humming and buzzing of bees may likely frighten their enemies in some cases. Certainly it scares those of the genus *Homo* in most cases. But that has nothing to do with the colors.

There seems to be a tendency for insects which are carnivorous in their early stages to be metallic, but there are very many exceptions to this rule. Thus in Coleoptera the Carabidæ are often metallic, but so are many of the plant-feeding Chrysomelidæ and several of the Curculionidæ, while many carnivorous beetles are dull. In Diptera, the blow-fly, *Lucilia*, is metallic. In Hymenoptera, the parasitic Chalcididæ are mostly metallic, while the plant-feeding Cynipidæ are brown, black or yellowish. And so on through numerous examples.

So much then on the colors of the stinging and stingless Hymenoptera. The question remains, what are they for? Why do they exist?

COLLECTING BY LAMPLIGHT.

BY A. S. VAN WINKLE.

No doubt many entomologists have spent night after night collecting different species of moths which can only be taken after dark. Many a time have I spent night after night, alone, down in the dark forest bordering the Mississippi in collecting on very warm, dark and damp nights when the harvest would be very productive, as many different species of Bombycidæ, Noctuidæ, Geometridæ, Pyralidæ, Tortricidæ, Tineidæ and Pterophoridæ would be captured, while on other nights I would be doomed to disappointment for after being up almost night I would collect little or nothing.

When one reads Dr. Wallace's delightful work entitled, "The Malay Archipelago," giving his experience of collecting in the eastern Tropics, especially the part referring to the subject of moth collecting at night, he cannot fail to appreciate its importance. Knowing full well that the readers of ENTOMOLOGICAL

NEWS, especially those who have not had the pleasure of reading Dr. Wallace's work will be interested in it, and that ENTOMOLOGICAL NEWS is chiefly devoted to this kind of literature I take pleasure in quoting the following passage: "While collecting on the island of Borneo what occupied me most was the great abundance of moths which, on certain occasions, I was able to capture. As during the whole eight years' wanderings in the East I never found another spot where these insects were at all plentiful, it will be interesting to state the exact conditions under which I here obtained them. On the one side of the cottage there was a verandah looking down the whole side of the mountain, and to its summit on the right all densely clothed with forest. The boarded sides of the cottage were whitewashed and the roof of the verandah was low and whitewashed. As soon as it became dark I placed my lamp on the table against the wall and with pins, insect-forceps, net and collecting-boxes by my side, sat down with a book. Sometimes during the whole evening only a solitary moth would visit me, while on other nights they would pour in in a continual stream, keeping me hard at work catching and pinning till past midnight, as they came literally by thousands. These good nights were very few. During the four weeks that I spent altogether on the hill I only had four really good nights, and these were always rainy, and the best of them soaking wet, but wet, rainy nights, were not always good, for a rainy moonlight night produced next to nothing. All the chief tribes of moths were represented, and the beauty and variety of the species was very great. On good nights I was able to capture from a hundred to two nundred and fifty moths, and these comprised on each occasion from half to two-thirds that number of distinct species. Some of them would settle on the wall, some on the table, while many would fly up to the roof and gave me a chase all over the verandah before I could secure them.

(To be continued.)

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NOTE.—By a slip of the pen I quoted Mr. Blanchard incorrectly in the April NEWS. *Corymbites crassus* is the female of *divaricatus*, and *not* as I there stated of *inflatus*.—G. H. HORN.

ELEMENTARY ENTOMOLOGY.

FIRST PAPER—WHAT IS AN INSECT?

While the study of Entomology, or the knowledge of Insects, is one of the most fascinating of pursuits, it is not a matter of wonder that many have been deterred from undertaking it, because of the difficulties with which it is hedged about, and the array of strange, technical words with which it is surrounded. The purpose of these articles is, therefore, to endeavor to popularize the study by explaining, in as simple a manner as possible, the various technical terms which, of necessity, must be employed by scientific writers.

The word Insect is, as a rule, very loosely employed by those who have not studied the subject. Even scientific usage of the word has varied, and Insects are sometimes regarded as equivalent to the group described later on in this paper under the name of Tracheata. In this series the word Insect is used in a restricted sense, and does not include such animals as spiders, centipedes and mites, and yet we would not exclude from the pages of this journal information about such creatures, since we hope to give our readers some very interesting notes on spiders (as well as on ants), from the pen of our fellow-member, the Rev. Dr. McCook, who has made the study of their habits a specialty, and who knows so well how to interest his readers.

Insects may be described as being (1) joint-footed animals, breathing by tracheæ; (2) having the body of the adult divided into three distinct portions,—head, thorax and abdomen; (3) having in the perfect or imago state, one pair of antennæ attached to the head.

(1) The joint-footed animals, or technically the *Arthropoda* (which is the Greek equivalent), are formed on a different plan from the other branches of the animal kingdom. Their bodies are composed of a series of rings (or *segments*), within which are the vital apparatus and muscles. It is true that many of the Worms have their bodies segmented, but no Worms have jointed feet. A vast number of animals are included within the *Arthropoda*,—not only the *Insecta*, but also the *Arachnida* (spiders, scorpions, etc.), the *Myriapoda* (centipedes, millipedes, etc.), certain curious animals known as *Onychophora*, and the *Crustacea*

(crabs, lobsters, shrimps, etc.). It is necessary, therefore, to find some differences which will distinguish the Insects from all other Arthropods.* One of these is the breathing by *tracheæ*, which are tubes, composed of thin membranes kept open by a fine, but stiff, wiry thread twisted spirally throughout the whole course of the tubes. The tracheæ have their external openings, called *spiracles* or *stigmata*, along the sides of the body. From the spiracles the tracheæ pass inwards and ramify in all directions throughout the body. The Crustacea breathe by gills, and hence form a division of the Arthropods called *Branchiata* (from the Greek work *brangchia*, gills). All other Arthropods than the crustacea breathe by tracheæ, or similar structures, and hence form the division *Tracheata*.

(2) The body of an adult insect is divided into *three regions*,—*head*, *thorax* and *abdomen*. In the Crustacea and Arachnida, there are, as a rule, *two* regions, the united head and thorax (*cephalo-thorax*), and the abdomen. In the Onychophorans and Myriapods the body is worm-like, and can hardly be said to be divided into regions (although, of course, segmented); the head, however, is distinct.

(3) Insects, when they have attained their imago or perfect form, have one pair of *antennæ* (or "feelers") attached to the head, three pairs of *legs* which are restricted to the thorax, and usually two pairs of *wings*, also attached to the thorax. The Arachnida have no true antennæ, but have four pairs of legs attached to the thoracic part of the cephalo-thorax. The Myriapoda and Onychophora have one pair of antennæ and numerous pairs of legs. The Crustacea have two pairs of antennæ and usually five or more pairs of legs to the thoracic part of the cephalo-thorax, and often some abdominal legs. No other Arthropoda than the Insecta have wings, and even some Insects are destitute of them during their entire life.

With respect to the states or forms assumed in the course of their lives, Insects may be grouped into three divisions:

1. Insects which pass through four states, viz., (1) the *Egg*, (2) the *Larva* (caterpillar, maggot, grub, or "worm"†), (3) the *Pupa* (chrysalis), usually a quiescent state, and (4) the *Imago* (perfect insect).

* The characters given in this paper for the classes of Arthropoda are mainly those used in Claus and Sedgwick's excellent Text Book of Zoology.

† Such as the "Tomato-worm," "Grape-vine worm," and similar plant-feeders.

2. Insects which pass through three states, viz., (1) the *Egg*, (2) the *Nymph* and (3) the *Imago*.

3. Insects which pass through two states, viz., (1) the *Egg*, and (2) the *Larva-form*.

1. Insects passing through four such states differ very much when in their larval state from the form which they possess when in their imago state, and hence are said to undergo a *complete* metamorphosis or transformation. Such are Bees, Butterflies, Beetles, etc. Very frequently the pupa is enclosed in a *cocoon* of silk, earth, chips, or other substance.

2. In other insects there is no distinction between the larval and pupal states, and the larva much resembles the imago, although differing noticeably by the wings being not yet developed as organs of flight. Such insects pass through an *incomplete* transformation. Lately the word *Nymph* has been used to denote that state of existence in such insects between the egg and the imago, although formerly it was synonymous with *pupa*. Insects with an incomplete transformation are Grasshoppers, Dragflies, etc.

3. These insects undergo no transformatton, the larval form being retained to the end of their existence. Such are Fish-moths and Spring-tails.

The growth of an insect is completed in its larval or its nymph state, and however long an insect may live, it never increases in size after it has attained its perfect form. The modes of passing through the successive changes of form vary much in the different orders of insects, and are always full of interest to careful observers. These changes will be referred to in future articles on the various orders.

The principal characters which distinguish the Insecta from the other classes of Arthropoda may be tabulated as follows (These characters apply only to adult individuals):

Arthropoda.—Animals with a segmented body and jointed segmental appendages.

A.—Breathing by gills (Division *Branchiata.*)

Body usually divided into a cephalo-thorax and an abdomen; two pairs of antennæ . . . . . Class I, **Crustacea.**

B.—Breathing by tracheæ (Division *Tracheata.*)

1. No true antennæ (Subdivision *Chelicerota.*)

Body usually divided into a cephalo-thorax and an abdomen; four pairs of thoracic feet; no abdominal feet. Class II, **Arachnida.**

2. With one pair of antennæ (Subdivision *Antennata*).

a. Body not divided into regions; feet fairly numerous,
Class III, **Onychophora** (or **Prototracheata**).
Class IV, **Myriapoda.**

b. Body divided into head, thorax and abdomen; six feet, restricted to thorax.
Usually with two pairs of wings, Class V. **Insecta** (or **Hexapoda**).

P. P. C.

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Additional Notes on some North American Odonata.

BY PHILIP P. CALVERT.

On Jan. 28, 1890, were published the separate copies of my paper entitled, "Notes on some North American Odonata, with descriptions of three new species (Trans. Amer. Ent. Soc. xvii, pp. 33—40, 1 pl.)." During the next two days I sent copies of my paper to various students of the Odonata. One of the new species I described under the name of *Leucorhinia Hageni*, figuring the inferior appendage and hamule of the male, and the vulvar lamina of the female. Under date of Feb. 2, 1890, Dr. Hagen wrote to me acknowledging the receipt of my paper, and stated that "your *Hageni* is, I believe, *L. hudsonica* Selys." He also sent me drawings of the male hamule and female valvules of *hudsonica*. I can now see no reason for believing *Hageni* to be specifically distinct.

Since the publication of my paper, Mr. Charles W. Johnson has kindly looked over my Floridan types of *Lepthemis gravida*. He tells me that he has collected this species flying over the salt marshes near St. Augustine, Fla. In the habitat given originally (l. c. p. 36) for this species, I have misspelled Ponto Rasso for Punta Rassa.

Students of the Odonata must rejoice in the recent publication of two parts of Dr. Hagen's new "Synopsis of the Odonata of North America," published in "Psyche" vol. v, Nos. 160 and 166, and dealing with the genera *Calopteryx* and *Anax*. I have recently compared the specimens of *Calopteryx* in my colleetion and that of the American Entomological Society, with Dr. Hagen's paper on that genus. In both collections *Calopteryx* is but poorly represented, and but few new facts were ascertained from the comparison.

Five North American species are recognized in the paper referred to, viz.: *C. angustipennis*, *amata*, *dimidiata* (with race *apicalis*), *æquabilis* (with races *hudsonica* and *yakima*) and *maculata*. Of these I have seen *dimidiata* (and r. *apicalis*), *æquabilis* and *maculata*.

Dr. Hagen states ("Psyche," v, p. 242) that "The genus *Calopteryx* largely represented in the northern boreal and temperate zone nowhere passes to the south beyond the 30th degree." I possess a male *dimidiata*, formerly in the collection of Prof. P. R. Uhler, of Baltimore; when Prof. Uhler gave this specimen to me it bore (and still bears) the label "Calopteryx, Honduras." Honduras, including that part under British rule, extends from about the 18th to the 13th parallel of North latitude. The most southern locality in all America for any species of *Calopteryx*, as given by Dr. Hagen, is Florida.

In the Am. Ent. Soc. collection are two males of *apicalis* from Delaware, a new locality. In the same collection are two females, one certainly, the other probably from Delaware; I think that they also belong to *apicalis*. The measurements of these females are: Total length 40—40.5 mm.; abdomen, 31.5—32.5 mm.; anterior wing, 30 mm.; posterior, 29 mm.

Of *æquabilis* I possess one male and one female, both taken by Mr. Harry L. Walker at Belvidere, Boone County, Ill., June 29, 1888, "on the bank of a little stream." Both agree very well with Dr. Hagen's description, except that the wings of the female are hardly smoky at the apex.

For *maculata* I add a new locality, Tama County, Iowa; two males and one female taken June 21, 28, 29, 1889, by Miss Alda M. Sharp.

Notes and News.

ENTOMOLOGICAL GLEANINGS FROM ALL QUARTERS OF THE GLOBE.

[The Conductors of ENTOMOLOGICAL NEWS solicit, and will thankfully receive items of news, likely to interest its readers, from any source. The author's name will be given in each case for the information of cataloguers and bibliographers.]

IDENTIFICATION OF INSECTS (IMAGOS) FOR SUBSCRIBERS.—Specimens will be named under the following conditions:

1st.—The number of specimens to be limited to twelve (12) for each sending.

2d.—The sender to pay all expenses of transportation and the insects to become the property of the American Entomological Society.

3d.—Each specimen must have a number attachcd so that the identifications may be announced accordingly.

Such identifications as can be given will be published according to number, in the issues of the NEWS. Address packages to *Entomological News*, Acad. Nat. Sci., Logan Square, Philadelphia, Pa.

NOTES FROM COLORADO.—*Timothy bugs.* On Aug. 21, 1889, I took ♂ and ♀ Pentatomids on Timothy-grass (*Phleum pratense*) by Willow Creek, Custer County, Col. They are identified by Mr. Ashmead as *Homæmus bijugis* Uhler, which is probably a variety of *H. aneifrons* Say.

Yucca-insects. One day I examined the flowers of *Yucca angustifolia* at West Cliff for insects, having at the time just read some articles on the *Yucca* controversy. I found many Aphides, and some ants, possibly *Formica ciliata* Mayr, and on the outside of one of the flowers a bee, *Nomia nortoni* Cress. The Hymenoptera were kindly examined by Mr. Ashmead.

Cœnonympha eggs. On June 26, 1889, I caught a ♀ *Cœnonympha ochracea* near Texas Creek, Custer County. From its abdomen I obtained an egg by pressure; it was pale yellow, globular and large for the size of the insect. It proved infertile.—T. D. A. COCKERELL.

J. W. TUTT—Rayleigh Villa, Westcombe Park, London, E. England—is engaged on a Monograph of the varieties of NOCTUÆ occurring in Great Britain, with descriptions, etc., of the varieties of these species occurring in other countries, and would be pleased to hear from the readers of ENTOMOLOGICAL NEWS as to any striking forms of variation that may come under their notice.

THE GLANVILLE FRITLARY.—"This butterfly took its name from the ingenious Lady Glanville, whose memory liked to have suffered for her curiosity. Some relations that were disappointed by her will, attempted to set it aside by acts of lunacy; for they suggested that none but those who were deprived of their senses, would go in pursuit of butterflies. Her relations and legatees cited Sir Hans Sloane and Mr. Ray to support her character; the last gentleman went to Exeter, and on the trial satisfied the judge and jury of the lady's laudable inquiry into the wonderful works of the Creation; and established her will.—*Harris' Aurelian* 1766.

"I RECOLLECT some ten or twelve years ago, one Sunday, whilst collecting in a neglected field, near Bernard's dam, that the proprietor of the ground, or of some neighboring territory, a pleasant, hale old gentleman, came down in his shirt sleaves to gratify his curiosity in regard to my doings. He first approached with the proper caution due to nearing an equivocal animal, but assuring himself by the placidity of my countenance, doubtless, that there was no apparent danger to be dreaded, he approached

me, and in the Pennsylvania German dialect asked what I was doing. I showed him my collecting-box and its contents, my net, etc., and as at that moment a large female of the *Ephestion* butterfly flew near, I joined example to precept by capturing and killing and pinning it in my collecting-box in his presence. The most difficult part to make the old gentleman comprehend, was what the things could be used for after they were caught. I attempted an explanation. Whether I was successful in doing so to his satisfaction I still doubt, however, he seemed pleased, and by way of explanation said, as he departed, 'Ich haab dich gasayn for ein bar Suntaag here und durt so rum springe un ich hab gaydenkt du waarst so ein kaerl wo nicht gons recht in kopf war, aber.'* Here he paused and looked puzzled, and I fear to this day the worthy old husbandman (bless his kindly face) is still, if living, in a state of suspense as regards my being responsible for my actions before the Lord and my fellow-man."

THE EXPEDITION sent out by the Academy has been heard from several times; they are doing good work, and are all well. The last report says, "We have just arrived at Vera Cruz after a very enjoyable and interesting time in Yucatan. Expect to go straight to Orizaba. This morning, early, we saw the snow-clad peak of Orizába in the distance."

WHILE watching a luna moth just after it emerged from the cocoon. I noticed that the small and unexpanded wings were light yellow in color, and I thought it would be abnormal in coloration, but at the base of the wing I saw a small area, which was of a beautiful light green, and as the moth gradually expanded the wings this was distributed through them, making the color normal. This is another proof of the fact that the wings are expanded by the moth pumping a fluid into them when they are soft and elastic.—H. SKINNER.

THE fine collection of insects made by the late Stephen Calverley has been presented to the Brooklyn Institute by his son.

PLANS FOR EXTERMINATING MOSQUITOES.—Mrs. Eugene M. Aaron, of 1832 Pine Street, has been awarded the first prize offered by Dr. Robert H. Lamborn, of New York City, for the best essay on the extermination of mosquitoes, especially by Dragon-flies. The second and third prizes have ceen divided equally between Mr. Archibald C. Weeks, 120 Broadway, New York, and Mr. William Beutenmüller, 132 East Seventy-sixth Street, New York. It is understood that Dr. Lamborn will publish the essays. The judges who made the awards were the Rev. Dr. Henry C. McCook, of the Academy of Natural Sciences of Philadelphia, and Prof. J. S. Newberry, of the School of Mines, Columbia College, New York.

Mr. J. D. EVANS, in the "Ottawa Naturalist," vol. iii, No. 4, reports *Erebia epipsodea* as being found at Sudbury on the Canadian Pacific Railroad.

* 'I have seen you running around here for the last couple of Sundays, and I thought you were one of those fellows who were not quite right in the upper story, but'——

Entomological Literature.

DIE ZWEIFLUGLER DES KAISERLICHEN MUSEUMS ZU WIEN, IV.—Vorarbeiten zu einer Monographie des Muscaria Schizometopa (exclusive Anthomyidæ) Pars I. Von Prof. Dr. Friedrich Brauer, W. M. K. Akad., und J. Edl. v. Bergenstamm (Mit 11 Tafeln). Denkschr. d. math.-wissens. Classe d. k. Akad. d. Wissensch. Bd. lvi, pp. 1—112, pls. i—xi, 4to. 1889. —Only he who has endeavored to find his way in the devious labyrinth of the calyptrate Muscidæ can appreciate this important and valuable paper, the most important that has ever appeared on the subject, and one that will mark a new epoch in our knowledge of the group. To give even an outline of its contents is impracticable here, nor would I feel at all competent for the task, were my opportunities unlimited. A paper that introduces fifty new families and one hundred and fifty new genera would appall any ordinary critic, and I know only enough about the insects to appreciate the labor and research the paper has cost. The authors, following out Prof. Brauer's previously published taxonomic views, present an almost entirely new classification of the group, which is coextensive with what has been generally known as the Muscidæ calyptratæ, with the inclusion of the Oestridæ. "Families," groups and genera are defined, and three hundred and ten admirable lithograph figures, graphically illustrate most of the genera. All the known genera are not included; only those of which the authors had definite or artoptic knowledge; still, there cannot be many wanting, and the work must remain as the *sine qua non* of all dipterologists who have anything to do with these flies. The work is nothing if not iconoclastic, and I do not think will, and ought not to, obtain the concurrence of entomologists in all respects. The authors' conception of the genus is, I think, not tenable, and there is a great lack of uniformity in the group names. But, whatever the differences may be, all will unite in their appreciation of the great value of this *bahubrechend work*.—S. W. WILLISTON.

PROCEEDINGS ACADEMY NATURAL SCIENCES PHILADELPHIA, Part III, 1889.—Antennæ of Coleoptera, by Geo. H. Horn, M. D. On a new species of Spider of the genus Dinopis from the Southern United States by Geo. Marx, M. D.

A SEASON'S WORK AMONG THE ENEMIES OF THE HORTICULTURIST, by Clarence M. Weed. The enemies referred to in this paper are of two kinds: insects and fungi. The insects treated of are the Rhubarb Snout Beetle, Imported Currant Worm, Plum Curculio, Striped Cucumber Beetle, Cherry Tree Slug and Strawberry Root Louse. The appropriate remedies are given to destroy each of these pests.

THE ENTOMOLOGIST, London, March, 1890.—The Evolution of Insect-galls by T. D. A. Cockerell. Notes on the Economy of *Retinia resinella*, R. Adkin. *Rhopalocera* at Digne, Mrs. Nicholl. One the Phylogenetic

significance of the wing-markings in certain genenera of the Nymphalidæ, F. A. Dixey. New species of Lepidoptera from China, J. H. Leech. Descriptions of new species of Phytophagous Coleoptera received by Mr. J. H. Leech from Chang-Yang, China, Martin Jacoby. Descriptions of the Homopterous family Cicadidæ, W. L. Distant. Notes on *Hybocampa milhauseri*, T. A. Chapman. Faroe Islands, Rev. Dr. Walker. Entomological Notes, Captures, etc., and doings of societies, etc., complete the number.

ANNALS AND MAGAZINE OF NATURAL HISTORY, vol. v, No. 27, London. —Descriptions of new species of Lepidoptera (Heterocera) from Central America, Herbert Druce. The new species mentioned in the above paper are figured in the Biologia Centrali-Americana. Descriptions of two new Central American Buprestidæ, C. O. Waterhouse. Description of a new *Papilio* from the West coast of Africa, H. Grose Smith (*Papilion harpagon*). On the constitution of the body in the Blattidæ, E. Haase. Description of a new genus of the Homopterous family Cicadidæ, W. L. Distant.

BIOLOGIA CENTRALI-AMERICANA, Part LXXXI, December, 1889.—(Received March, 1890). Contains ARACHNID ARANEIDEA, O. Pickard Cambridge, pp. 49—56, pl. 5, thirteen colored figures. COLEOPTERA, vol. ii, pt. 2. H. W. Bates, pp. 385—416, pl. 24, twenty-five colored figures. COLEOPTERA vol. iii, pt. 1, C. O. Waterhouse, pp. 169—193. COLEOPTERA vol. iv, pt. 2, G. C. Champion, pp. 103—120, pl. 5, twenty-five colored figures. LEPIDOPTERA, HETEROCERA, H. Druce, pp. 337—344, plate 5, twenty-fiva colored figures. RHYNCHOTA HETEROPTERA W. L. Distant, pp. 321—328, pl. 30, twenty-five colored figures. Quite a number of new species are described and handsomely illustrated.

BIOLOGIA CENTRALI-AMERICANA Part LXXXII, January, 1890 (Rec'd March, 1890).—COLEOPTERA vol. ii, part 2, H. W. Bates, pp. 417—432. COLEGPTERA vol. iv, part 2, G. C. Champion, pp. 121—160, plates 6 and 7, fifty-one colored figures. LEPIDOPTERA HETEROCERA vol. i, H. Druce, pp. 345—368, plate 31, fifteen colored figures. DIPTERA vol. ii, F. M. van der Wulp, pp. 41—56.

The ENTOMOLOGIST'S MONTHLY MAGAZINE (London) March, 1890.—Synopsis of the British ORTHOPTERA (continued), Eland Shaw. COLEOPTERA in Norfolk, James Edwards. Descriptions of some new species of South American Halticidæ of the group ŒDIPODES (continued), Martin Jacoby. Descriptions of four new species of the genus *Castnia* from South America, Herbert Druce. Notes on British *Tortrices* (continued), C. G. Barrett. Notes on the COLEOPTERA and LEPIDOPTERA (*Rhopaloc.*) of Norway, G. C. Champion (with list of Norwegian butterflies by W. M. Schöpen). Notes on British and Exotic Coccidæ. J. W. Douglas. HEMIPTERA HETEROPTERA at Dover and its vicinity, G. C. Hall. *Stenamma*

Westwoodii at Maidstone, G. E. Frisby. *Cis cis bilamellatus* breeding in captivity, Rev. Theodore Wood. *Harpalus obscurus* H. R. Tottenham. Casual captures of COLEOPTERA, J. J. Walker. COLEOPERA in the North of Ireland, Rev. W. F. Johnson. *Oberea oculata*, Rev. C. Fowler. *Mycterus curculionides* from near Oxford, Id. On the larva of *Glæa spadicea* and *G. vaccinii*, T. A. Chapman, M. D. A point concerning hybridization, H. W. Vivian. Some MICRO-LEPIDOPTERA of the Chalk Hills near Reading, W. Holland. *Aciptilia paludum* in the New Forest, Id. *Mecyna polygonalis* Tr. in New Zealand, E. Meyrick. *Nepticula pyri*, a species new to Britain, J. H. Wood. *Scoparia basistrigalis* as distinct from *S. ambigualis* G. T. Porritt. Identity of *Dianthœcia carpophaga* and *D. capsophila*, W. F. H. Blandford. *Drepanopteryx phalænoides* in Durham, Amos Mitchell.

Doings of Societies.

ENTOMOLOGIVAL SECTION ACADEMY NATURAL SCIENCES OF PHILADELPHIA, March 27, 1890.—Members present: Messrs. Martindale, Ridings, Skinner, Liebeck, Seeber, Castle, Calvert, Westcott, Mr. Mengel and Mr. Fox, visitors. Dr. Geo. H. Horn, Director, in the chair. Verbal communications being in order, Dr. Horn called attention to a box containing *Cercyon* and allied genera, with all the known species represented. He exhibited plates showing anatomical characteristics of *Cercyon*. The shape of the meso-sternum was considered in relation to classification. A lighter colored region of the meta-sternum is defined or not according to circumstances. The genus *Cryptopleurum* has a well defined line or extension of the meta-sternum, which has value as a basis of comparison. In *Cercyon* the pro-sternum is a carina, and in some genera a broad plate. Points in the comparative anatomy of the genera were considered at length. He further stated that the proper way to study genera is by a comparison of the gradations of anatomical features. Mr. Calvert spoke of the list of dragon-flies collected at Manchester, Me., by Miss Wadsworth, forty-three species being enumerated, which is a very creditable showing. The number of species observed in comparison to other places is large, as in Great Britain only forty-six species are enumerated according to McLachlan. Mr. Calvert estimated the species of this locality (Philadelphia) as fifty. *Epitheca Walshii* is the rarest species in the Maine list, only four ♂ and one ♀ specimens being known. Dr. Hagen has lately published a synopsis of the dragon-flies of North America, to which Mr. Calvert called attention. The following specimens were donated to the cabinet: *Rhodites fusiformans* Ckl., four specimens; *Syntomaspis monticola* Ashm., one specimen. Galls of *Trypeta bigeloviæ* Ckl. Galls of

Rhodites rosæfoliæ, Ckl. (the flies have since emerged), all from Mr. Cockerell, West Cliff, Colorado. *Pimpla grapholithæ* Cress., presented by Dr. John Hamilton.

ENTOMOLOGICAL SOCIETY OF WASHINGTON.—March 6, 1890. Mr. Schwarz exhibited and remarked upon the following species of Coleoptera, which are new to the fauna of North America: *Lathridius* (*Coninomus*) *nodifer* Westwood; *Actinopteryx fucicola* Allibert; *Arrhipis Laneri* Guerin and *Probatius umbratilis* Duval. He also showed specimens of *Temnochila Hubbardi* Léveilleé, and *Teretriosoma Hornii* Lewis, recently described in European journals from the semi-tropical region of Florida. He finally drew attention to Dr. Horn's recent Revision of the North American species of *Ochthebius*, and spoke of the geographical distribution of these aquatic beetles. Discussion followed by various members.

The Secretary presented a note on a Dipterous larva infesting the seeds of Xanthium. He had found that these larvæ at Manhattan, Kansas and during the past winter in the District. Drawings were exhibited illustrating the larva and the nature of its work.

The Secretary also presented a short note on the food-habits of *Psiloptera drummondi*.

These notes were discussed by Schwarz, Townsend and Howard.

Mr. Townsend read a paper entitled, "Notes on Acridiidæ in Michigan," which related more particularly to dates of appearance and habits.

C. L. MARLATT,

Recording Secretary.

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ERRATA.

Page 56, line 10 from top, for exista *read* exusta.
" 58, " 6 from bottom, for Sagmache, *read* Sagnache.
" 60, " 5 from top, for Amstat, *read* Austat.
" 61, " 15 from top, for *Dyctidæ* read *Dyctidea*.
" 61, " 18 from top, for *Tilicen* read *Tibicen*.
" 64, " 6 from top, for *fusciformans* read *fusiformans*.
" 64, " 8 from top, for *Cemthophilus* read *Centhophilus*.

ENTOMOLOGICAL NEWS for April was mailed March 25, 1890.